



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,531	07/31/2006	Stefan Fechtel	1406/324	5903
25297 7590 12/23/2009 JENKINS, WILSON, TAYLOR & HUNT, P. A. Suite 1200 UNIVERSITY TOWER 3100 TOWER BLVD., DURHAM, NC 27707				
EXAMINER				
HUANG, DAVID S				
ART UNIT		PAPER NUMBER		
2611				
MAIL DATE		DELIVERY MODE		
12/23/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/566,531

**Applicant(s)**

FECHTEL ET AL.

**Examiner**

DAVID HUANG

**Art Unit**

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/22)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 9/28/2009 have been fully considered but they are not persuasive.

Applicant's argument: Since Examiner acknowledges that Lepla fails to teach or suggest the features of claim 1 that involve the use, generation, or calculation of the spurious energy, it is implicit that Lepla likewise fails to teach or suggest the particular case when the spurious energy can be set externally. Lepla provides that where frequency-dependent noise is dominated by noise within the receiver electronics, the noise power spectrum may be measured off-chip, and values for a carrier dependent weight are programmed into weight source 310. It is respectfully submitted that this feature is not the same as externally setting the expected spurious energy... Hui discloses systems contained within the receiver device 204, and thus Hui does not teach or suggest the expected spurious signal energy being set externally.

Examiner's response: Hui discloses auto-correlation memory 420 "external" to channel estimator 415 that generates the channel coefficients (Fig. 4, autocorrelation memory 420, separate from channel estimator 415; stored candidate autocorrelation values in memory 420, col. 9, line 40 - col. 10, line 21, correspond to white/colored disturbances  $v(n)$ , col. 2, lines 15-35; see also Fig. 5). As recited, claim 1 only requires that the expected spurious energy be set externally, but does not specify external to what. In the case of Hui, the expected spurious energy is external to the channel estimator. Thus, Lepla, taken in combination with Hui and APA, discloses every element of the weighting circuit of independent claim 1.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vandenameele-Lepla (US 2003/0128751 - hereinafter Lepla) in view of Hui et al. (US 6,674,820) and applicant's admitted prior art (specification, pages 2-3, Fig. 2; hereinafter "APA").

Regarding claim 1, Lepla discloses a weighting circuit for a receiver which is provided for receiving a multicarrier signal comprising carrier signals (carrier-specific weighting factors of a multi-carrier signal in a receiver, page 2, [0013]),

wherein the weighting circuit weights the carrier signals such that the spurious signal energy is of equal magnitude for all weighted carrier signals (value of each carrier-specific weighting factor is inversely proportional to a noise power associated with the carrier, page 3, [0021]; weights are the inverse of the noise power for a carrier page 6, [0051]; thus, if the weights are the inverse of the noise power, then the noise after application of the weights to each carrier would be 1, i.e.  $[x * (1/x) = 1]$ ).

However, Lepla fails to expressly disclose (i) a memory storing a plurality of weighting coefficient sets, and

(ii) a selector selecting one of the plurality of weighting coefficient sets stored in the memory on the basis of an expected spurious signal energy in the received signal,

(iii) an estimation unit calculating said expected spurious signal energy using cross correlation between the received signal and a spurious signal to be expected which has been phase-shifted through  $90^\circ$ .

(iv) wherein said expected spurious signal energy is set externally.

Nevertheless, Lepla discloses the values of the carrier-dependent weights are controlled to account for the effect of frequency-dependent (non-white) noise in the system (page 6, [0050]; non-white = frequency dependent, page 2, [0013]).

With respect to items (i), (ii) and (iv), Hui et al. discloses systems for receiving signals subject to colored noise (title, Fig. 4). Hui et al. discloses systems for estimating the color of the baseband noise by selection of the best result among a plurality of candidate noise color assumptions (col. 3, lines 37-41). The color characteristic of the colored noise may be an auto-correlation of the colored noise (col. 3, lines 55-60). Whitening filters are determined in advance for each candidate auto-correlation value and saved in memory, and the predetermined whitening filter is selected at block 515 (col. 10, lines 4-7). Thus, candidate auto-correlation values (expected spurious signal energy), is associated with different whitening filters stored in memory (weights). Hui further discloses auto-correlation memory 420 for storing candidate auto-correlation values corresponding to disturbances  $v(n)$  (col. 9, lines 40-67, Figs. 4 and 5; see also col. 2, lines 15-40 for auto-correlation of disturbance  $v(n)$ ; equation 2). Thus, the auto-correlation memory 420 sets the expected/candidate auto-correlation values external to the channel estimator 415.

Because both Lepla and Hui et al. disclose receiving apparatus and methods for accounting for colored (non-white noise) by selecting a set of weighting factors/filter

(coefficients), it would have been obvious to one of ordinary skill in the art to substitute one teaching for the other, for the predictable result of storing different sets of factors/filter (coefficients) in memory and selecting one based on the color characteristic of the non-white/colored noise, and setting the candidate auto-correlation values external from the channel estimator.

With respect to item (iii), APA discloses a prior art receiver with an estimation unit that calculates the spurious signal by cross-correlation between the received signal (via the ADC) and spurious signals which are to be expected which has been phase-shifted through  $90^\circ$  (page 3, lines 8-9).

Furthermore, Hui et al. also discloses auto-correlation of the colored noise is calculated according to equation 8 (col. 8) with an autocorrelation lag 1, such that the two signals multiplied together are time-delayed (phase-shifted) versions of the signal.

Because both APA and the combination of Lepla and Hui et al. disclose correlation calculations between delayed signal to determine noise signal energy, it would have been obvious to one of ordinary skill in the art to substitute one teaching for the other for the predictable result of generating a signal by cross-correlating a received signal with an expected spurious signal phase shifted by  $90^\circ$ .

Regarding claim 2, Lepla, Hui et al., and APA disclose everything applied to claim 1, and Hui et al. further discloses the weighting circuit has at least one multiplier which multiplies an associated carrier signal by a stored weighting coefficient from the selected weighting coefficient set (FIR whitening filter multiplies filter coefficients  $\{h(k)\}$  and signal  $r(n)$ , col. 9, lines 3-10).

Regarding claim 3, Lepla discloses everything applied to claim 1, and further discloses wherein the memory can be programmed via an interface (noise power spectrum measured off-chip and values for the carrier dependent weights programmed into weight source 310, page 6, [0051], Fig. 3).

Regarding claims 4 and 5, Lepla discloses everything applied to claim 3, and further discloses the multicarrier signal is broken down into carrier signals by a computation circuit that is a Fast Fourier Transformation circuit (FFT 126, Fig. 1).

Regarding claim 7, Lepla discloses everything applied to claim 1, and further discloses the expected spurious energy can be set externally (noise power spectrum measured off-chip and values for the carrier dependent weights programmed into weight source 310, page 6, [0051], Fig. 3).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vandenameele-Lepla (US 2003/0128751 - hereinafter Lepla) in view of Hui et al. (US 6,674,820) and applicant's admitted prior art (specification, pages 2-3, Fig. 2; hereinafter "APA") as applied to claim 5 above, and further in view of Nasserbakht (US 6,122,703).

Regarding claim 6, Lepla, Hui et al., and APA disclose everything applied to claim 5, but fail to expressly disclose the carrier signal broken down by the computation circuit are buffer-stored in a buffer store.

However, FFT output buffers are well known in the art, as evidenced by Nasserbakht (FFT output buffer 326, col. 10, lines 49-56, Fig. 3).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to provide an output buffer for storing the output of the FFT circuit, since FFT output buffers are well known in the art.

***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID HUANG whose telephone number is (571)270-1798. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSH/dsh  
12/17/2009  
/David Huang/  
Examiner, Art Unit 2611  
/Shuwang Liu/  
Supervisory Patent Examiner, Art Unit 2611